

## Project Update: April 2021

### JULY 2020 - APRIL 2021

#### Expeditions

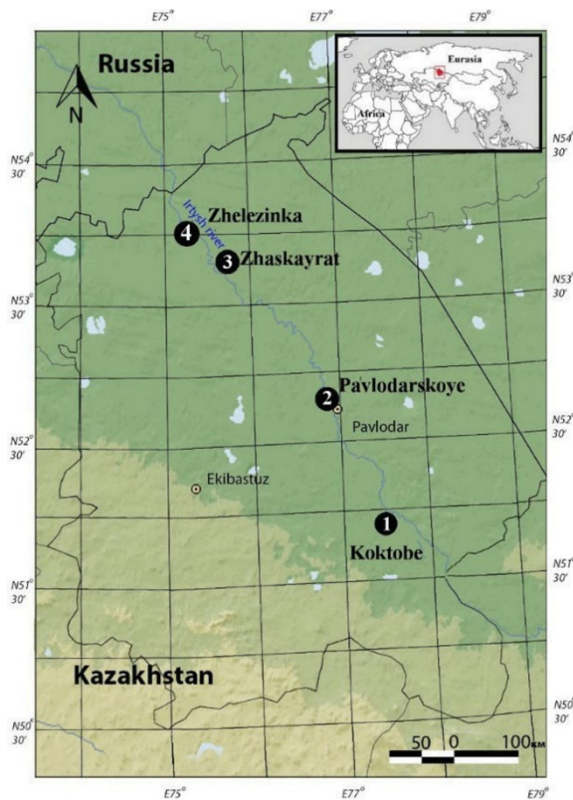
Volunteer nature lovers of the city of Pavlodar and geobotanist Viktor Kamkin from Toraigyrov University took part in our expeditions.

The fieldwork schedule since July 2020 has undergone minor adjustments during quarantine measures related to the manifestation of the Covid-19 virus.

From 04.07.2020 to 29 October 2020, 39 days of field research were carried out:

Apr20	Jul20	Aug20	Sep20	Oct20
05-06	03-04	01-02	01-02	01-02
	05-06	10-11	10-11	10-11
	08-09	21-22	05-06	21-22
	10-11	05-06	06-07	05-06
	13-14	08-09	08-09	08-09
	15-16	11-12	12-13	13-14
	21-22	13-14	13-14	15-6
	25-26	15-16	15-16	25-26
	28-29	25-26	25-26	28-29
		30-31	28-29	

The research took place at three main control sites: №1, №2, №3 and one more additional №4. Locations of field studies in 2020:



№1 Koktobe village Zmeinyy yar control site.

№2 Pavlodarskoe village.

№3 village Zhaskayrat village Ay-Sary control site.

№4 (additional control site) village Zhelezinka.



Participants of the Rufford project expedition: research leader, Sergey Titov and driver Maxim Steshenko among the floodplain willow forest at the control site №1 - Koktobe village Zmeinyy yar.

### **Exploration of suitable habitats for mixed red underwing (*Catocala deducta*)**

From July 1<sup>st</sup> to 3<sup>rd</sup> 2020, an exploratory trip was carried out along the Irtysh river valley in the Pavlodar region in order to find and select three control sites with probable habitat of *Catocala deducta*.

The exploration was carried out using a visual method, searching for dense areas of floodplain forest dominated by large and tall *Salix* and *Populus* trees with dense undergrowth of tall grass and an abundance of various shrubs were. A driver with 4x4 SUV car was hired for reconnaissance and further work.



Control site №1 Zmeinyy yar. Willow forest in the valley of the Irtysh river.



Control site №2 in the vicinity of the Pavlodarskoye village. White willow and black poplar forest in the Irtysch river valley.



Control site №3 near the village of Zhaskairat (Ai Sary tract). Forest with the participation of white poplar in the valley of the Irtysch river.

## Research methods

The most effective method for detecting *Catocala deducta* turned out to be cage traps filled with wine, sugar and fruit baits, which we hung in the forest on the branches of trees.

To efficiently assess the *Catocala deducta* population a plastic food container with a transparent lid was used to remove the moth from the cage trap. It is convenient to determine the sex and colour of the specimen and observe the marks of re-captured individuals through the transparent lid of the container. To prevent recounting of already counted individuals, moths were marked with individual marks (removal of scales) left on the lower part of the abdominal sternites. If captured specimen was previously marked and registered, then the drawing of its mark was photographed.

The rest of the species of moths attracted to light traps in all locations of the control sites underwent species registration and were photographed if possible. After the completion of data collection, all specimens, except for those caught for the first time for the fauna of the Pavlodar region, were released back to their habitat.



Preparing to install field equipment.



Light trap with mixed-glow mercury lamp.



Head of the Rufford project Sergey Titov during the registration of moths arriving in a cage trap.



Marks on abdominal sternites of captured *Catocala deducta* specimen to account for population abundance.



Cage traps with aromatic bait made from wine, sugar and overripe bananas.

### Geobotanical description of control research sites

To clarify the ecological conditions under which *Catocala deducta* lives, a detailed geobotanical description of forest biocenoses was carried out in the area of each



research site on an area of  $100 \times 100 \text{ m}^2$ . Geobotanical description for our study was kindly agreed to be carried out by geobotanist Viktor Kamkin, who visited all control sites of the project.

Viktor Kamkin is conducting a geobotanical description at the control site №2.

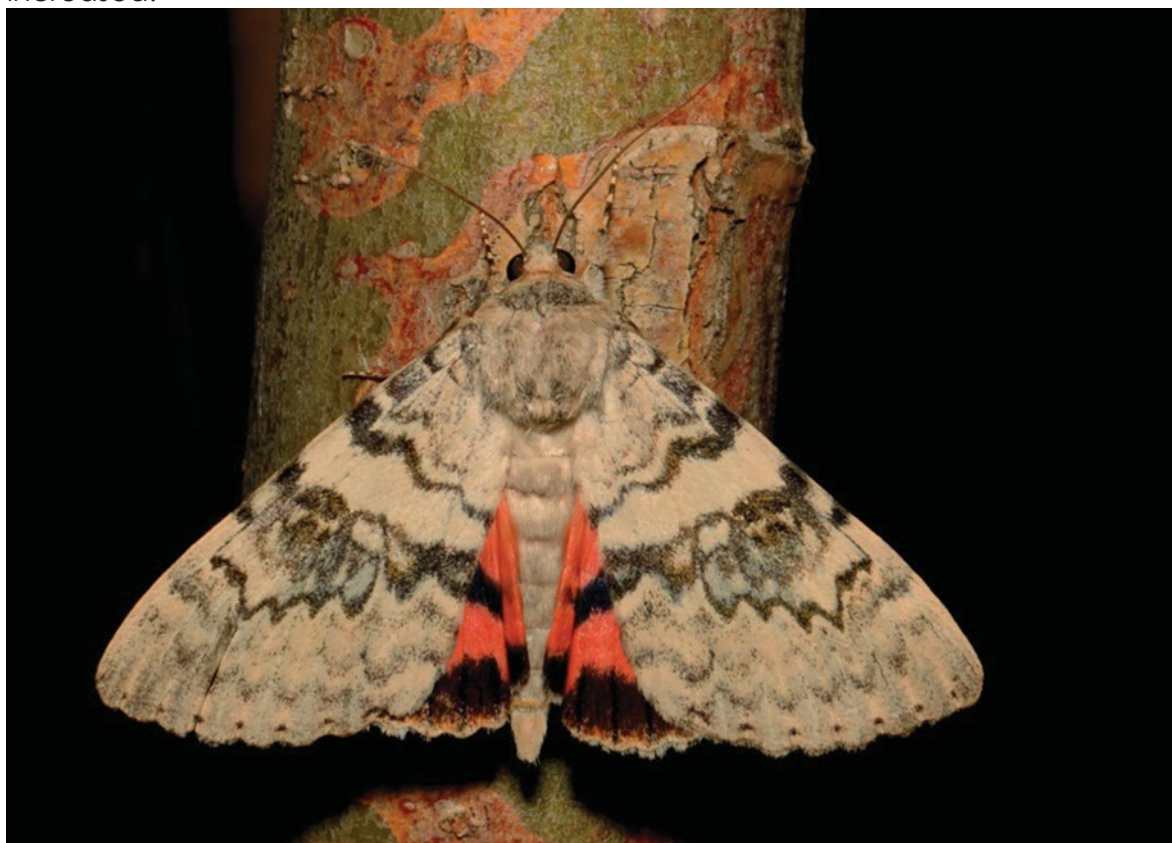
## Research results

### The first data on the ecology of *Catocala deducta*

In the initial stage of the study, throughout July 2020, no adults of *Catocala deducta* were found. Other species of the genus *Catocala*, for example, *Catocala nupta*, *C. fulminea*, and *C. puerpera*, actively flew. *Catocala nupta* was the dominant species in the floodplain forests in 2019. Moreover, this species flew in large numbers both to light traps and to wine and fruit baits.

The dynamics of flight of representatives of the genus *Catocala* in 2019 continued. As rare exceptions we managed to see *Catocala adultera*, a rare Siberian species which caterpillars feed on *Populus tremula*, at sites №2 and №3.

On 8<sup>th</sup> August 2020 in Terenkol district, 3 km south-west of the village Zhaskayrat, in the Ai- Sary tract in the biocenosis of the floodplain forest at the control site №3 (Zhaskayrat), the first specimen of *Catocala deducta* was found. Finally, we got lucky! This meeting finally breathed renewed optimism into the exploration process. The likelihood of finding the areas where the population of this species lives has increased.



The world's first photo of a white form of *Catocala deducta* in nature.

On 13<sup>th</sup> August 2020, 177 years after *Catocala deducta* species was described by the discoverer Eduard Friedrich Eversmann in 1843 I took the world's first photographs of light form of this rare and endangered species. Previously, only numerous photos of grey and ash forms were taken.

It was a great honour for me to touch the history of this rare moth and for the first time after almost two centuries to see the rarest variety of the rare *Catocala deducta*.



The gray form of *Catocala deducta* is dormant on poplar bark. An example of the effectiveness of protective coloration.

On 13<sup>th</sup> August 2020, a stable population of *Catocala deducta* was found in which several gray and white forms of the upper wings were present. I had already begun to lose hope of meeting *Catocala deducta* slowly. Most of all I didn't want to believe that the species in the territory of the Pavlodar region of Kazakhstan was represented by stray migratory individuals only and does not form stable populations.

Over the entire period of the late summer - early autumn cycle of phenological observations from 8<sup>th</sup> August 2020 to 15<sup>th</sup> October 2020, we observed 42 individuals of the *Catocala deducta* population at control site №3, among which 17 females, and 25 males were recorded.

These counts were made possible by cage traps with wine and fruit baits. In the process of working with light traps, *Catocala deducta* never flew in 2020, in previous years there were only single arrivals.

As a result of the study of four control sites, the population of *Catocala deducta* was found in one only. So, in the Pavlodar region, two locations for the detection of the species were recorded, one location is old at control site №2 and one location is new at site №3.

To our surprise, the population of *Catocala deducta* was found not in the south of the Pavlodar region, as it was supposed, but unexpectedly in the north, at the limit of its range.

Based on the data obtained, a map of the distribution of *Catocala deducta* in the Pavlodar region was compiled. On the border of the Kachirsky and Zhelezinsky districts of the Pavlodar region, the border of the maximum distribution of the



*Catocala deducta* range was established. Among all the recorded specimens of *Catocala deducta*, specimens with a white coloration of the upper wings (the so-called white forms) prevailed. Of the 42 marked individuals, 38 individuals (22♂ / 16♀) with white wings and four individuals (3 ♂ / 1 ♀) with gray colors were noted. During the research, it was found out that *Catocala deducta* prefers a forest formed from old trees of the white poplar *Populus alba* for settlement.

The association of *Catocala deducta* with forest biocenoses with a predominance of white poplar is partly explained by the presence of two colour forms in the population. During daylight hours, we were able to observe individuals of *Catocala deducta* with gray upper wings, which rested on gray bark, which is present in white poplar only in the lower part of the tree trunk. As well as individuals with white upper wings, which preferred to rest in the upper part of the trunk of the white poplar, where its bark has a light, almost white colour.

We assume that polymorphism within the *Catocala deducta* population, expressed by the presence of two colour forms is an ecological adaptation of the species and fully fulfills its main purpose - it masks and hides the insects resting in the daytime, from daytime predators, by protective coloration of the upper wings.

On 8<sup>th</sup> October 2020, we met the last individual in the field season. At night, one male, already poorly flying with damaged wings, flew into the cage trap on a wine-sugar bait.

After analysing all the meetings for the entire time of observation of *Catocala deducta* in the natural conditions of the Pavlodar region, we found out that the time of emerging of adults begins in late July and ends in early October. Thus, the total time of activity of adults varies within the time frame of two months.

In the course of observation, we found that the imago of *Catocala deducta* begins its activity with the onset of complete darkness and ends it by 2:00 a.m. The total activity time of moths is 4 hours (from 11:00 p.m. to 2:00 a.m.). In late September and early October, the activity time is reduced by an hour due to a decrease in the overall temperature.

Thanks to the work of light traps at the control sites, we were able to collect a voluminous data array to obtain information on the composition of the fauna and the period of activity of all phenological groups of Noctuoidea living in forest biocenoses together with *Catocala deducta*.

### **Educational activities and popularization of knowledge about insects.**

In January 2020, two versions of information posters with the image of mixed red underwing *Catocala deducta* in A3 format were developed. The developer of the poster calendar was Georgy Peresvetov, the author of the second version of the poster was Alexander Shevchenko. In both cases, the author's photographs were used, taken by Sergey Titov in natural conditions and thanks to the project of the Rufford Foundation.

All information posters have a QR tag with a link to the Rufford project page. The first version of the information poster shows a photo of a typical floodplain forest in the Irtysh river valley. mixed red underwing flies in the air against the background of

willow and poplar trunks. Gray and white forms rest on tree trunks with closed wings. The poster has a grid of the calendar for 2021, 2022, 2023, the logo of the Rufford Foundation, as well as inscriptions in the capital letters in three languages (Kazakh, Russian and English):

«ҚҰТҚАРАЙЫҚ! / СПАСЕМ ИХ! / SAVE! ». At the bottom edge there is a collage by G.Yu.Peresvetov.

The second version of the information poster shows the world's first photo of a white form of mixed red underwing sitting on a branch of a white poplar in a state of warning (with the help of her red lower wings, which she opened slightly, she tries to scare a potential predator) against the background of night space. As in the first version, the poster contains the logo of the Rufford Foundation and the inscriptions in the capital signal font in three languages (Kazakh, Russian and English): «ҚҰТҚАРАЙЫҚ! / СПАСЕМ ИХ! / SAVE!». The name of the species *Catocala deducta* and the author of the photograph are written in the bottom margin.





Educational information posters featuring mixed red underwing *Catocala deducta*.

On 31<sup>st</sup> January 2021 a popular science lecture on the topic of the Rufford project was held for members of the Pavlodar House of Geography public association and the Jurbay Young Local History Club, accompanied by a Microsoft PowerPoint presentation.

From 2<sup>nd</sup> to 28<sup>th</sup> February 2021 online and offline seminars were held in schools in the city of Pavlodar and in the villages of Koktobe and Zhaskairat.

In March 2021, lectures were held for first- and second-year environmental students of Toraigyrov University.

In the journal "Bulletin of the Pavlodar House of Geography", a popular science article is being prepared for publication about a rare species of moth *Catocala deducta*, which is being studied and tried to preserve in the forests of the Irtysh River valley with the support of the Rufford project.





Lecturer Sergey Titov and members of the Club of young local historians "Dzhurbay".

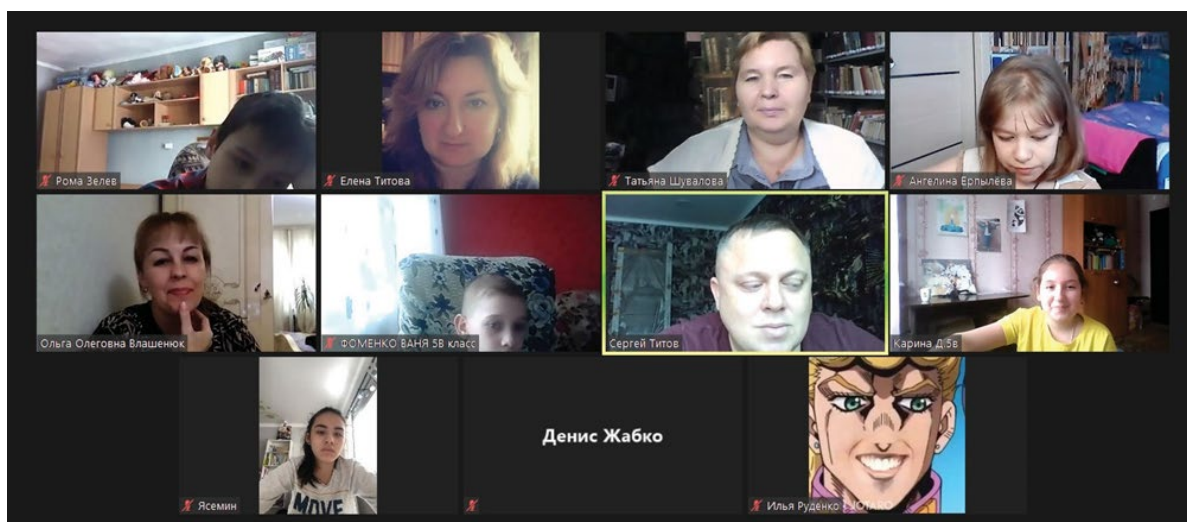
Offline and online seminars were held for teachers and students of rural and urban schools in Pavlodar region.



Lecturer Sergey Titov and students at school №43, after an offline seminar.



Lecturer Sergey Titov and students at school №43, during an online seminar.

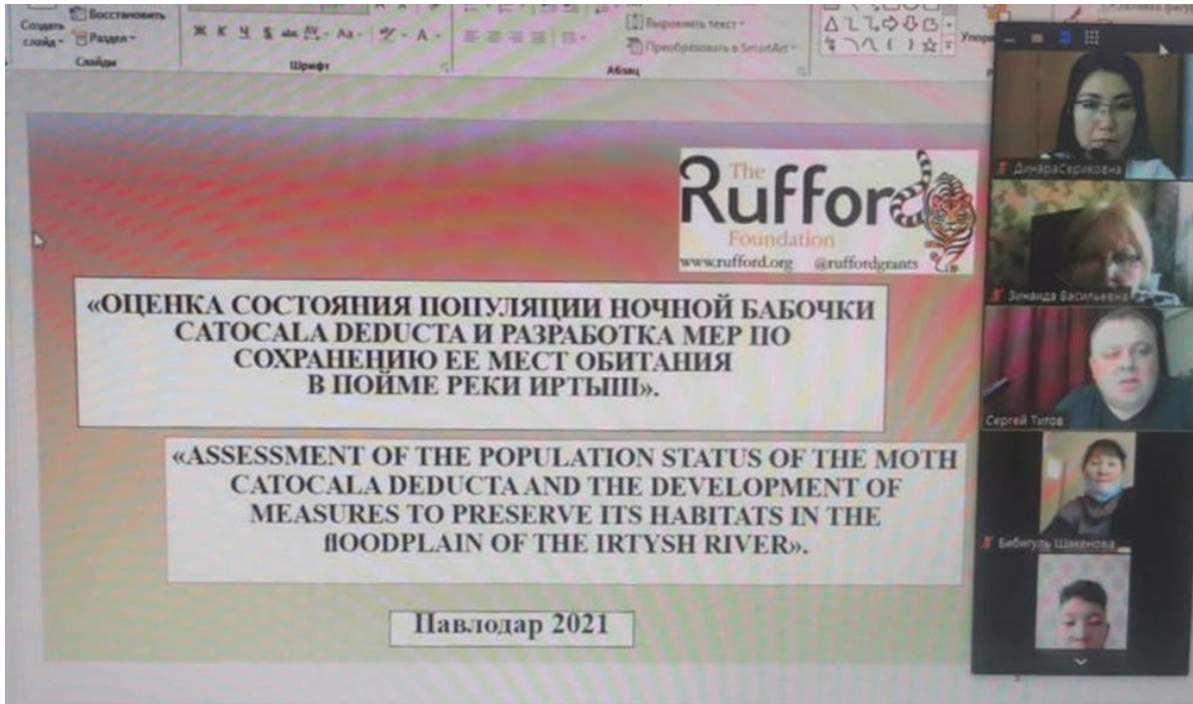


Lecturer Sergey Titov and students at the school of the village of Koktobe, during an online seminar.

During the seminars for schoolchildren and interested organisations, the main direction of the information provided was the expansion and popularisation of general knowledge about insects, their importance for our environment and our future on the planet using the example of mixed red underwing *Catocala deducta*, one of the many rare species that are vulnerable to anthropogenic pressure on their natural habitats. Also discussed were the limiting factors that affect the population of *Catocala deducta* and measures to preserve the rare and beautiful species of moths in our region.

### Environmental activity

On the basis of the research carried out and the scientific work on the topic of the project being prepared for publication, a biological rationale was formed for the inclusion of *Catocala deducta* in the Red Book of Kazakhstan.



Lecturer Sergey Titov and students at the school in the village of Zhaskairat, during an online seminar.



An official document on the consideration of *Catocala deducta* as a candidate for inclusion in the Red Book of Kazakhstan on the basis of the biological justification submitted by Sergey Titov.